THE AMERICAN SPECIES OF DACNUSINAE, EXCLUDING CERTAIN DACNUSINI (HYMENOPTERA: BRACONIDAE)

BY

GARLAND TAVNER RIEGEL

B. S., University of Illinois, 1938

M. S., University of Illinois, 1940

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN ENTOMOLOGY
IN THE GRADUATE SCHOOL OF THE
UNIVERSITY OF ILLINOIS, 1947

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Much of the work included in this thesis was done while holding a Fellowship from the Graduate School, University of Illinois.

R. UNIV. BIBLIOTHEEK LEIDEN

THE AMERICAN SPECIES OF DACNUSINAE, EXCLUDING CERTAIN DACNUSINI (HYMENOPTERA: BRACONIDAE)

Introduction

The members of the subfamily Dacnusinae, together with the closely related subfamily Alysiinae, are probably the most easily recognized of the small parasitic wasps belonging to the family Braconidae. Wesmael (1835) called them *"les braconides exodontes,"* because of the unusual mandibles common to them. These mandibles do not overlap or even touch at the tips when closed; in fact, they are widely separated. Also, the tips curve outward instead of in toward the face as is usually the case with Braconidae. When fully open the mandibles project out on each side of the head and can be seen with the naked eye, making one think of a "handlebar" mustache. The Dacnusinae differ from the Alysiinae in lacking cross-vein 3 r-m in the fore wings.

The American species of the Dacnusinae have never been treated systematically. One genus (*Symphya*) was revised in Rohwer in 1914; otherwise only isolated species have been described by various authors.

In 1943 Nixon published the first part of his "Revision of the European Dacnusini". This tribe as defined by Nixon includes the genus *Dacnusa* and its allies, characterized by having the "hairs of at least tergites 4-6 arranged more or less to form a row on each segment". This character has proven to be very useful in practice.

This study includes all the genera that do not fall in the tribe Dacnusini Nixon (not authors), together with the genera of the Dacnusini that have hairy eyes. Nixon has noted (as have others earlier) that the Dacnusine genera outside his tribe Dacnusini fall into several natural groups, and indicates

that eventually these groups should be given tribal rank. With this I agree, but feel that this grouping into tribes in the rest of the subfamily should be delayed until further study of certain characters can be made.

Four of the genera included in this paper—*Epimicta, Aristelix, Coelinius* and *Polemochartus*—as yet have no American species assigned to them. However, because *Chaenusa, Chorebidea* and *Sarops* are now recognized from our fauna, it seems best in include illustrations, references and notes on the European forms, as American species may be discovered when these parasites are better collected.

These insects are parasites of Diptera, mainly stem boring and leaf mining maggots, and can be collected abundantly where these flies occur. Some have considerable economic importance. In America, *Coelinidea meromyzae* (Forbes) and *C. ferruginea* Gahan are parasitic on the wheat stem maggot, *Meromyza americana* Fitch.

Method of Study

In this work considerable use has been made of the male and female genitalia as an aid in establishing specific and generic limits. Restricted use has been made of these structures recently in England for the study of Braconidae, but in America they have been neglected except for portions that can be seen without dissection. The genitalia of both sexes have proven to be valuable adjuncts to the external characters. Also they have given good indications as to intergeneric relationships.

The method of preparing the genitalia for study has been discussed in some detail. The parts are cleared in weak KOH and studied unstained in temporary glycerin slide mounts. After study the genitalia and associated structures are stored in glycerin in micro-vials attached to the pin bearing the remainder of the specimen.

Faunal Limits of the Study

As no species have been described by other workers from Central or South America in the genera under consideration, and no material from these regions is available in any collection in the United States that I have examined, this study actually includes only America north of Mexico.

Literature

A great effort has been made to include all references that have appeared in the literature to genera and species included in this study. A bibliography of 206 titles is included. All of the references except one were seen.

Types

The types of the seven previously described American species of *Coelinidea* are in good condition, and all were studied. In every case the genitalia were dissected out and studied.

The species of *Symphya* are not reviewed in this paper, so the types in that genus were not studied. Mr. G. E. J. Nixon of the Imperial Institute of Entomology, London, compared the type of a new species of *Sarops* with the type of the genotypic species, *S. rea* Nixon.

Specimens of genotypic European species were obtained from Mr. Nixon, Mr. A. W. Stelfox, Dublin, and various American museums. These were useful for comparison with American species being described in certain genera for the first time.

Morphology and Terminology

One hundred fifty-one figures of structures used in keys and descriptions are given.

Terminology used for the wing venation follows Ross' modification (*Ann. Ent. Soc. Amer.* 29: 99-111, 1936) of the

Comstock-Needham system. The terminology for the male genitalia follows that given by Peck (*Canad. Jour. Res., D,* 15: 221-274, 1937), and for the female genitalia largely follows that of Snodgrass (*Smithsonian Misc. Collect.* 89(8): 1-148, 1933).

The structure of the male and female genitalia is discussed.

Key to Genera of Dacnusinae (Excepting Dacnusini Nixon in Part)

1. Eyes bare ---- 4
1- Eyes hairy. (Hair may be short, sparse, and visible only at high magnification in strong light.) (Some Dacnusini) ---- 2

2. Cell Cu_1 closed below by a definite vein (not just a fold and/or dark pigment); stigma short, wide; labial palps with 4 segments; females occasionally with abdomen greatly compressed and attenuated ---- *Chaenusa*
2- Cell Cu_1 open below (outline of vein gone, though its former position may be indicated by fold in wing membrane and/or some dark pigment ---- 3

3. Wing with vein $R_S + M$ & M gone (not just obsolescent), stigma short, wide; labial palps with 3 segments; female abdomen short; gonoforceps of male genitalia not stocking-shaped in lateral view; second valvifer of female genitalia with large phragma above insertion of ovipositor sheath, and dorsal plate of proctiger firmly fused to ninth tergum ---- *Chorebidella*
3- Wing with vein $R_S + M$ & M present or obsolescent (seldom completely gone), stigma long; labial palps with 3 segments; females of some species with abdomen greatly compressed and attenuated; gonoforceps of male genitalia stocking-shaped in lateral view; second valvifer of female genitalia with small or no phragma above insertion of ovipositor sheath, and dorsal plate of proctiger attached to ninth tergum by narrow rod ---- *Chorebidea*

4. Setae of abdominal tergites 4-6 more or less forming a row across segment. (Doubtful cases such as some species of *Rhizarcha* have 2r arising from stigma far before the middle, and stigma greatly attenuated—*fide* Nixon) ---- OTHER DACNUSINI
4- Setae of abdominal tergites 4-6 numerous and scattered, not forming row, or these segments almost hidden under a hard carapace formed by segments 2 and 3 ---- 5

5. Body slender, the abdomen at least two and a half times as long as wide; tergites 2 and 3 not fused into short or long carapace; postscutellum unarmed ---------- 7
5- Body stout, the abdomen not more than twice as long as wide; tergites 2 and 3 fused into short or long carapace; postscutellum sometimes with tooth-like projection ---------- 6

6. Postscutellum with stout tooth-like projection; tergites 2 and 3 forming sculptured carapace that covers most of abdomen - *Symphya*
6- Postscutellum with only a weak median projection; tergites 2 and 3 covering about half of abdomen ---------- *Epimicta*

7. Abdomen petiolate, segment 1 at least twice as long as wide at apex ---------- 9
7- Abdomen more or less sessile, segment 1 about one and a half times as long as wide at apex ---------- 8

8. Size 6-9 mm.; head above and behind eyes punctate; tarsal claws spatulate at tips (true of *melas?*); all abdominal tergites hard and lightly punctuate; abdomen of female not compressed at distal end ---------- *Polemochartus*
8- Size 3-4.5 mm.; head above and behind eyes impunctate; tarsal claws pointed at tips; only abdominal tergites 1, 2 (and sometimes part of 3) hard and sculptured; abdomen of female compressed at distal end ---------- *Sarops*

9. Vein 2r arising from stigma before the middle; clypeus flat and not forming angle with or projecting beyond level of face in lateral view; size small (2-2.5 mm.) ---------- *Aristelix*
9- Vein 2r arising at or beyond middle of stigma; clypeus rounded and forming angle with or projecting beyond level of face in lateral view; size larger (more than 3 mm.) ---------- 10

10. Radius sinuate before apex; mandibles 4 toothed ---------- *Coelinius*
10- Radius evenly curved before apex; mandibles 3 toothed (with usually an obvious trace of the fourth) ---------- *Coelinidea*

The new genus, *Chorebidella,* is not validated by inclusion in this abstract, as the type is not given.

Treatment of Genera and Species

For all genera and species references are given, as well as figures and notes on bionomics. Where necessary notes on nomenclature are appended.

CHAENUSA Haliday. A key to the four known American species, all new, is given, with descriptions of the species. The female genitalia seem to be of less value in species identification in this genus than they are in others.

CHOREBIDELLA New Genus. Related to both *Chorebidea* and *Chaenusa*, this genus exhibits characters of both, and thus seems in some ways to bridge the short gap between them. The genotype is a new species.

CHOREBIDEA Viereck. A key to the four American species is included. These are all hitherto undescribed.

SYMPHYA Foerster. As this genus was fairly recently revised, the six nearctic species are not redescribed in this paper.

EPIMICTA Foerster. To date no American species have been included in this genus, but further collecting may show that it is represented in our fauna.

POLEMOCHARTUS Schulz. Another European group that has not been taken in the nearctic region. The distribution of the host flies, and the plant inhabited by the flies, is discussed.

SAROPS Nixon. Four new species are described and a key given.

ARISTELIX Nixon. As yet undiscovered in America, and known only by the one European species, *phaenicura* (Haliday).

COELINIUS Nees ab Esenbeck. The status of the one known palaearctic species, *parvulus* (Nees), and its many synonyms are discussed in some detail. A representative of this genus has not been found in the nearctic region.

COELINIDEA Viereck. A key is furnished to the 39 known American species, 32 of which are new to science. One

of the most common and beneficial species, *C. meromyzae*

(Forbes), is shown in the accompanying illustration. (Cut courtesy of Illinois Natural History Survey.)

Ericoelinius Viereck is listed as a new synonym of *Coelinidea.*

Genera Incorrectly Placed in the Dacnusinae

Through evidence furnished by Muesebeck, *Provancheria* Ashmead is placed in synonymy with *Eubadizon* Nees (Blacinae or Calyptinae) and thus eliminated from consideration in the Dacnusinae. Muesebeck (*Proc. U. S. Natl.*

Mus. 79(16): 13, 1931) has shown *Nebartha* Walker is a synonym of *Rogas* Nees (Rogadinae), and that (*op. cit.*) *Heratemis* Walker is related to *Phaenocarpa* Foerster and thus belongs in the Alysiinae (*s. str.*), not the Dacnusinae. With the information given by Muesebeck concerning *Heratemis* I have pointed out that the African species, *H. longicornis* Brues 1924, probably belongs in a new genus in the Dacnusinae.

VITA

The candidate was born August 26, 1914, in Bowling Green, Missouri. His grade and high school education was obtained in the public schools of Troy and Palmyra, Mo. He graduated as valedictorian of his high school class in the latter city in May, 1932. The next two school years he attended Hannibal-La Grange College, Hannibal, Mo. In February, 1935, he entered the University of Illinois. During the summer of 1935 he served as a junior entomologist in a CCC forestry camp near Western Springs, Ill., and upon his return to Urbana was employed as a part time technician in the Department of Entomology, reentering the University in February, 1936. The summer of 1936 was spent in the Chicago area on a Japanese beetle survey and control project. In February, 1938, he received the B. S. degree with Highest Honors in Entomology. From March, 1937, to July, 1942, he was employed by the Illinois Natural History Survey. In February, 1940, he was granted the M. S. degree in Entomology, and in February, 1942, completed his preliminary examinations for the doctorate. On July 22, 1942, he entered active duty in the Army as a 1st Lt. in the Sanitary Corps and was released April 19, 1946, as a Major. He served 26 months in Algeria, Tunisia and Italy with the 12th and 13th Malaria Survey Units. The candidate reentered the University in June, 1946. Since October, 1946, he has held a Graduate School Fellowship in Entomology.

The candidate was married December 20, 1941, to Ruth Anne Agate, and they have two children, Anne Roberta and Garth Griffith.

He was elected an associate member of Sigma Xi in 1938, and is a member of Phi Kappa Phi, Phi Sigma, the Entomological Society of America, the American Association of Economic Entomologists, and the Illinois State Academy of Science.

He has published the following:

"An Insect With Seven Tarsi (Coleop.: Scarabaeidae)." Ent. News 47: 158, 1936, illus.

"Relative Abundance of *Cylclocephala immaculata* and *C. borealis* at Urbana." Trans. Ill. State Acad. Sci. 34: 234-235, 1941, illus.

"*Cyclocephala abrupta* in Illinois (Coleop.: Scarab.)." Trans. Ill. State Acad. Sci. 35: 215, 1942, illus.

"Wasps and Water." Ent. News 57: 33-34, 1946, illus.